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### An Empirical Analysis of Financial Risk Tolerance and Demographic Features of Individual Investors

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#### Abstract

Financial risk tolerance is the level of risk that a client believes they are willing to accept. Risk Tolerance must be measured simply because it is an aspect of utility for any investment decision and maximizing the expected utility is considered to be the ultimate goal in any financial activity. The paper reports the results of the study that was designed to examine the association /relationship between the risk tolerance of individual investors and their demographic features. Most of the anticipated relationship between financial risk tolerance and each of the demographic features from the literature were found to be relevant.

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**Keywords-** Financial Risk Tolerance; Demographic Features; Finametrica Score

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#### 1. Introduction

Financial risk tolerance is commonly defined as the maximum amount of volatility one is willing to accept when making a financial decision. It is important to note that risk tolerance is a complex attitude. It has four facets - financial, physical, social and ethical. Whether in the context of professional practice or empirical research, risk tolerance is acknowledged as an important factor in savings and investments choices for retirement or other household goals. Choices regarding investment products, asset allocation plans, and portfolio accumulation strategies have been attributed to risk tolerance. Individual risk tolerance may also be taken into account as a part of “risk management” or insurance choices. Risk tolerance plays an important role in each household's optimal portfolio decisions. An investor's ability to handle risks may be related to

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demographic features such as age, gender, marital status, occupation, income, time horizon, liquidity needs, portfolio size, investment knowledge, and attitude toward price fluctuations. The demographic features of individual investors could be used to distinguish between levels of financial risk tolerance and an association of these variables could be developed to predict a person's risk-tolerance.

## 2. Review of literature

Empirical studies on financial risk tolerance of individual investors in relation to their demographic, socioeconomic, and attitudinal factors are limited. Some of the related studies on various determinants of financial risk tolerance are as follows:-

MacCrimmon, and Wehrung (1986) provided the seminal literature and research review concerning risk tolerance which examines research associated with the relationships among demographic, socioeconomic, and attitudinal factors, and financial risk tolerance. Wallach and Kogan (1961) began studying relationship between risk tolerance and age. They found that older individuals tended to be less risk tolerant than younger persons. Slovic(1966) concluded, after an extensive review of the literature, that a “prevalent belief in our culture is that men should and do take greater risks than women” In general, there is consensus among researchers that women tend to be less risk tolerant than men. It is widely assumed by practitioners that marital status is a factor that significantly influences risk and return preferences; and an individual's satisfaction with finance (Lazzarone, 1996).

According to Roszkowski, M.j; Snelbecker, G.E; and Leimberg, S.R (1993), other things being equal, different occupations of individual investors can be used to differentiate between their levels of financial risk tolerance. Over the years a positive pattern between income of individual investors and their financial risk tolerance has been observed (Cohn, RA; Lewellen, WG; Lease, R.C; and Schlarbaum, G.G, 1975; Cicchetti and Dubin, 1994; and Shaw, 1996). A person's level of formal education has been found to influence risk tolerance (Baker and Haslem, 1974; and Grable and Lytton, 1998). Researchers such as Grable and Joo (1997); Grable and Lytton (1997); and Sung and Hanna (1996) have suggested that a person's knowledge of personal finance and economic expectations may play a role in shaping risk preferences.

As a whole, there is a persistent belief among practitioners and researchers that (a) males are more risk tolerant than females, (b) younger individuals are more risk tolerant than older individuals, (c) single individuals are more risk tolerant than married individuals, (d) individuals employed in professional occupations are more risk tolerant than those employed in non-professional occupations, (e) self-employed individuals are more risk tolerant than those employed by others, (f) high income earners are more risk tolerant than lower income earners, (g) Whites are more risk tolerant than non-whites, and (h) individuals with higher attained educational levels are more risk tolerant than those with lower levels of attained education. However, there are research data not supporting these beliefs. Therefore, more research is needed to test these assumed relationship.

### 3. Objectives and hypothesis

#### 3.1. Objectives of the study

- To assess the financial risk tolerance of individual investors.
- To examine the dependence/independence of the demographic factors of the investors and his/her financial risk tolerance.

#### 3.2. Hypothesis used for the study

- Gender and financial risk tolerance of individual investors are independent of each other ( $H_0$ ).
- Increase in age decreases the financial risk tolerance of individual investors ( $H_1: \rho \neq 0$ ).
- No association between marital status and financial risk tolerance of individual investors ( $H_0$ ).
- Greater levels of attained educational levels are associated with increased financial risk tolerance of individual investors ( $H_1$ ).
- High income earners are more financial risk tolerant than lower income earners ( $H_1: \rho \neq 0$ ).
- There exist a negative relationship between the number of dependants and financial risk tolerance of individual investors ( $H_1: \rho \neq 0$ ).

### 4. Methodology

#### 4.1. Database description

The data were obtained from a survey of employees of two universities in India such as University of Kerala, and Mahatma Gandhi University. Employees chosen for inclusion in the sample were randomly selected from a list of all faculties and staff of the selected universities. Specifically, 10 percent of all employees ( $N=3000$ ) i.e. 300 respondents were selected as sample units for the study. The survey was held during the year 2010. The respondents received a risk-tolerance assessment questionnaire of *FinaMetrica* developed by an Australian company. The *FinaMetrica* personal profiling system is a commercially provided computer-based risk tolerance measurement tool. This tool is widely used by leading academic educators and researchers around the world. Numerous academic studies have employed the *FinaMetrica* test and/or data. The company has provided permission to use the test tool for the research purpose.

#### 4.2. Variables used for the analysis

Financial risk tolerance, as determined by each respondent's score on the risk assessment measure developed by *FinaMetrica* was used as the dependent variable. The *FinaMetrica* personal profiling questionnaire consists of 24 questions along with a number of demographic variables. The survey included questions about demographic features of each respondent such as gender, age, marital status, education, annual income, and number of dependants. These variables were used as independent variables. The coding for each independent variable is presented in Table 1.

Table 1 Variables definition.

Variables	Measurement
Gender	1 = male 2 = female
Age	Age in years (25-75)
Marital Status	1 = married 2= unmarried
Education	1 = undergraduate 2 = postgraduate 3 = above Postgraduate
Annual Income	Amount in Indian Rupees
Number of dependants	1= Only yourself 2=1 person in addition to yourself 3=2 to 3 persons in additions to yourself 4=more than 4 persons in additions to yourself

#### 4.3. Classification of the sample units

The risk profile of the sample units on the basis of financial risk tolerance score of each respondents measured by *FinaMetrica* has been classified and presented in Table 2.

Table 2 Risk profile of the sample respondents.

Financial risk tolerance group	Risk score range	Number of respondents
Low Risk Group (Risk Group I and II)	0-34	60 (20%)
Medium Risk Group (Risk Group III and IV)	35-54	102 (34%)
High Risk Group (Risk Group V, VI and VII)	55-100	138 (46%)
Total	0-100	300 (100%)

Percentage of their respective totals in parenthesis.

The *FinaMetrica*'s risk profile system categorize individuals in to seven risk groups on the basis risk score 0 - 100 continuum from risk-avoiding to risk-seeking. But, the present study rearranges the risk groups and conveniently classified into three categories viz; low, medium, and high risk group, without affecting the parameters of risk tolerance of *FinaMetrica* risk profile system. Low risk group consists of risk group I and II; medium group represented by risk group III and IV; and high risk group constituted by risk group V, VI and VII.

#### 4.4. Statistical test/tools used for the analysis

The association/relationship between financial risk tolerance score and various demographic factors have been investigated with the help of statistical tools such as Chi-square test and Correlation analysis.

### 5. Empirical results

#### 5.1. Gender and financial risk tolerance

It is found that the calculated value of  $\chi^2$  (5.939) is less than the tabulated value (5.991) and thereby the null hypothesis is to be accepted (d.f = 2;  $p < 0.05$ ). Thus, it is to be concluded that gender of the individual investors and financial risk tolerance are independent of each other.

#### 5.2. Age and financial risk tolerance

The study revealed that a relatively low positive correlation exist in between age and financial risk tolerance of individual investors (Karl Pearson's Coefficient of Correlation:  $r = 0.2614$ ). While testing the significance of the Pearson's correlation coefficient between the two variable shows that the calculated value ( $t = 6.417$ , d.f = 288,  $p < 0.05$ ) is more than the tabulated value (1.645), and falls in the rejection region. So, the null hypothesis is to be rejected, and concluded that there is significant positive correlation between age and financial risk tolerance. Hence, it is established that increase in age increases the financial risk tolerance of individual investors.

#### 5.3. Marital status and financial risk tolerance

It is observed that the calculated value of  $\chi^2$  (39.69) is more than the tabulated value (5.991), it falls in the critical region, the null hypothesis is to be rejected (df = 2;  $p < 0.05$ ). Thus, it is to be concluded that marital status is associated with financial risk tolerance of individual investors.

#### 5.4. Level of Education and financial risk tolerance

Since, the calculated value of  $\chi^2$  (16.93) is more than the tabulated value (9.49), it falls in the critical region, and therefore, the alternative hypothesis is to be accepted (df = 4;  $p < 0.05$ ). Thus, it is to be concluded that the financial risk tolerance is associated with the level of education of individual investors.

#### 5.5. Annual income and financial risk tolerance

The study supports the hypothesis that high income earners are more risk tolerant than lower income earners. There is significant positive correlation exist in between financial risk tolerance and annual income of individual investors (Karl Pearson's Coefficient of Correlation:  $r = 0.9924$ ). Because, the testing of significance of the Pearson's correlation coefficient between to the two variable shows that the calculated value ( $t = 16.97$ , d.f = 288,  $p < 0.05$ ) is more than the tabulated value (1.645), and falls in the rejection region. So, the null hypothesis is to be rejected, and concluded that there is significant positive correlation between the income and the financial risk tolerance of individual investors.

### 5.6. Number of dependants and financial risk tolerance

Karl Pearson's Coefficient of Correlation shows relatively low negative correlations exist between the number of dependants and the financial risk tolerance of individual investors ( $r = -0.20998$ ). While testing the significance of the Pearson's correlation coefficient between the two variable shows that the calculated value ( $t = 4.679$ ,  $df = 288$ ,  $p < 0.05$ ) is more than the tabulated value (1.645), and falls in the rejection region. So, the null hypothesis is to be rejected, and concluded that there is significant negative correlation between the number of dependants and the financial risk tolerance of individual investors.

## 6. Conclusion

Most of the anticipated association/relationship between financial risk tolerance and each of the demographic or socio-economic variables of individual investors from the literature were found to be relevant. It is generally thought that financial risk tolerance of individual investors decreases with their age. But, the present study fails to support this view, or even provide evidence to the contrary. The common belief is that single people are more risk tolerant than married ones. The present study also shows that there is significant association between marital status and financial risk tolerance. The study agrees that higher levels of formal education increases one's ability to evaluate risk and therefore gives a higher financial risk tolerance. The present as well as many other studies found a positive relationship between income of individual investors and their financial risk tolerance. Only few of the studies hypothesized that number of dependants of individual investors could affect the level of financial risk tolerance. However, the present study indicates significant low negative correlation between the number of dependants and financial risk tolerance. However, the analysis of different demographic factors of individual investors with their financial risk tolerance indicates that the demographic features of individual investors could be used to distinguish between levels of financial risk tolerance, and an association of these variables could be developed to predict a person's risk-tolerance.

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